

LAKE COUNTY, ILLINOIS

2012 DIAMOND LAKE SUMMARY REPORT

PREPARED BY THE
LAKE COUNTY HEALTH DEPARTMENT
Population Health Environmental Services



**Mundelein Park District's Diamond Lake Wakeboard Spectacular,
 Dan Luedert~Sun-Times Media**

Diamond Lake is a glacial lake, with a surface area of 153.2 acres and a maximum depth of 23.6 feet. The Village of Mundelein borders the east and north shorelines, and the remaining shoreline is unincorporated. Diamond Lake offers power boating, swimming, fishing, and aesthetics for private and public lake users. Lake activities are administered on the lake by three main entities: Mundelein Park

District, Oak Terrace Homeowner's Association and West Shore Park Homeowner's Association. Diamond Lake has also been a participant in the Illinois Environmental Protection Agency's (IEPA) Volunteer Lake Monitoring Program since 1996.

Diamond Lake receives water from its approximate 686.2 acre watershed that includes four inlets; two located on the southwestern

portion of the lake by Illinois Route 83, one in the Oak Terrace subdivision and one West Shore Park subdivision. Diamond Lake drains into Indian Creek and eventually the Des Plaines River. The primary land uses within the Diamond Lake watershed were single family homes, water, and agriculture.

In general, the water quality in 2012 was good. Many water quality parameters

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LAKE FACTS**Major Watershed:**

Des Plaines

Sub-Watershed:

Indian Creek

Surface Area:

153.17 acres

Shoreline Length:

3.09 miles

Maximum Depth:

23.56 feet

Average Depth:

7.65 feet

Lake Volume:

1171.59 acre-feet

Watershed Area:

686.16 acres

Lake Type:

Glacial

Current Uses:swimming, fishing,
power boating, and
aesthetics**History and Pictures
Provided by:**Greg Denny: Diamond Lake
Resident**Reference Sources:**Digital Past, and
"Mundelein" by Shawn
Killackey (Arcadia Press,
2009)**LAKE SUMMARY (CONTINUED)**

have not changed significantly since the 2002 lake study.

Total phosphorus concentrations in Diamond Lake averaged 0.039 mg/L in 2012 which is a 5% increase from the 2002 concentration of 0.037 mg/L. The total

phosphorus concentrations in 2002 and 2012 did not exceed the Illinois Environmental Protection Agency's (IEPA) impairment level of 0.050 mg/L.

However monitoring by the IEPA Volunteer Lake Monitoring Program (VLMP) had phosphorus

concentrations exceeding the applicable standard 2007-2011. Nitrogen is the other nutrient critical for algal growth. The average Total Kjeldahl nitrogen

concentration for Diamond Lake was 0.84 mg/L which was lower than the 2002 value by 30% (1.20 mg/L).

A total nitrogen to total phosphorus (TN:TP) ratio of

23:1 indicates phosphorus was limiting. Also using phosphorus as an indicator, the trophic state index (TSI_p) ranked Diamond Lake as eutrophic with a TSI_p value of 57.0.

The 2012 average total suspended solids (TSS) concentration for Diamond Lake was 6.5 mg/L, which was less than the 2012 county median (8.2 mg/L) and a slight reduction from the 2002 value of 5.9 mg/L.

Water clarity was measured by Secchi depth, with the lowest reading in September (2.00 feet) corresponding with the highest TSS concentration (7.6 mg/L). The average Secchi depth for the season was 3.17 feet which is slightly higher than the county median (2.99 feet).

Conductivity readings, are correlated with chloride

concentrations, the average conductivity reading for Diamond Lake was 0.8330 mS/cm, which was above the county median (0.8020 mS/cm). This was a 1% increase from the 2002 average (0.8374 mS/cm). The chloride concentration in Diamond Lake in 2012 was 165 mg/L which is above the county median of 136mg/L.

Plant sampling was conducted on Diamond Lake in April and July. One macro-algae and seven species of aquatic plants were present covering approximately 35% of the lake. Coontail and Eurasian Watermilfoil were the two most abundant species found at 20% and 16% of the sites, respectively. Curlyleaf Pondweed and Eurasian Watermilfoil are exotic and invasive that tend to crowd out native species when left unmanaged.



HISTORY

The area around Diamond Lake has been inhabited since at least 1650, when the Potawatomi Indians were known to have been trading with French fur traders. The first European inhabitants reached the area in the early 19th century. Peter Shaddle (for whom a street is named) was the first known settler, building a log cabin in the area now owned by St. Mary of the Lake Seminary in 1835. There are records in the Fremont Library of an Indian camp on the south side of Diamond Lake

The next settlers were tradesmen escaping from England's industrial depression, who became farmers in the Mundelein area. In honor of their former professions, they named the city "Mechanics Grove", and built schools, churches, and businesses. The immediate area around Diamond Lake was actually a town called

"Diamond Lake"

The Mundelein area (while still unincorporated) changed its name to "Holcomb" in honor of John Holcomb, a person who was active in the area's development. As Holcomb, the community added a railway station and a post office. The Holcomb area later incorporated in February 1909 under a new name, "Rockefeller"; a reference to businessman John D. Rockefeller. The Town of Diamond Lake then became a part of "Rockefeller".

The area near the lake was mostly composed of farms with a big emphasis on dairy products, especially cheese, and there was a large creamery in the town of Diamond Lake.

The Diamond lake area also had a large number of icehouses, supplying all of Libertyville with ice. However, Diamond Lake's

greatest value was as a fishing resort. The shoreline of the lake at this point is described as being mostly composed of rushes.

In the early 1900's, Diamond Lake had been gradually changing to a resort oriented community. A number of resorts, camps, hotels located on or near the Lake, including: Bills (where the former Gayle Street Inn was located), Lakeside Cottage Resort, Allenbachs, Tatlers Hotel, Cranes Resort and Flanders Tavern were located in the Diamond Lake area.

Like the rest of the country, the Diamond Lake era underwent a post World War II housing and population boom. Much of the surrounding watershed was platted into lots for home development, with a corresponding increase in population.



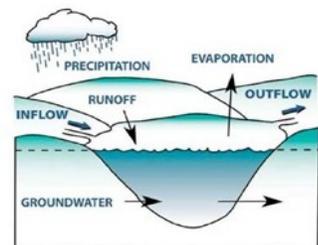
**Rays Ice Cream 1915
Ft. Sheridan Troops 1908
Rowboat 1913**

WATERSHED

The source of a lake's water supply is very important in determining its water quality and choosing management practices to protect the lake. A watershed is an area of land where surface water from rain and melting snow meet at a point, such as a lake or stream. The watershed of Diamond Lake encompasses approximately 686.16 acres, draining large residential areas to the west and south of the lake. The size of the

watershed feeding the lake relative to the lakes size is also an important factor in determining the amount of pollutants in the lake. The watershed to lake surface area ratio of 5:1 is small. This is positive in that it may help minimize serious water quality problems that often accompany larger watershed to lake ratios by identifying and correcting pollutant sources.

The principal water source in Diamond Lake comes from the drainage of the land within the watershed. Precipitation has a direct effect on the volume of the lake as storm runoff is directed from impervious surfaces into the lake. As the lake volume increases some water quality parameters can become less concentrated; creating a flushing effect. In 2012 there was no outflow from the lake from July



DRAINAGE LAKE

A LAKE FED BY STREAMS, GROUNDWATER, PRECIPITATION AND RUNOFF AND DRAINED BY A STREAM

WATERSHED (CONTINUED)



Storm water coming from the West side of 83 under the road and a sanitary sewer, overflowing and running down the same incline through Weich park into the lake.

through September. However some water quality parameters were actually lower during the dryer sampling years when compared to the years with higher precipitation. This may indicate that there is a source of pollution occurring during storm events. In May 1996 and February 1997, the Lake County Public Works Department received complaints about sewage overflows from lift stations adjacent to the southern shore of Diamond Lake. In both instances, heavy rains caused high water flows to overload the lift stations. A rough estimate of 200,000 to 250,000 gallons bypassed the lift stations. Since these events, Lake County Public Works has upgraded parts of the systems in this area, and made several repairs. In 2011 sanitary sewer overflows were documented coming

from the west side of Illinois Route 83. In an attempt to quantify the amount of phosphorus and total suspended solids entering Diamond Lake various inlet samples were scheduled to be collected in addition to the in lake samples. However the inlets remained dry throughout the 2012 sampling season and the rain events that occurred did not produce sufficient runoff for sampling.

The outlet of Diamond Lake is located on the eastern side of the lake. The Drain flows southeast and enters Indian Creek Illinois Route 83 and Diamond Lake Road, eventually draining into the Des Plaines River. Retention time, the amount of time it takes for water entering a lake to flow out of it again, was calculated to be approximately 2.38 years. Based on the 2012 data, the current external sources

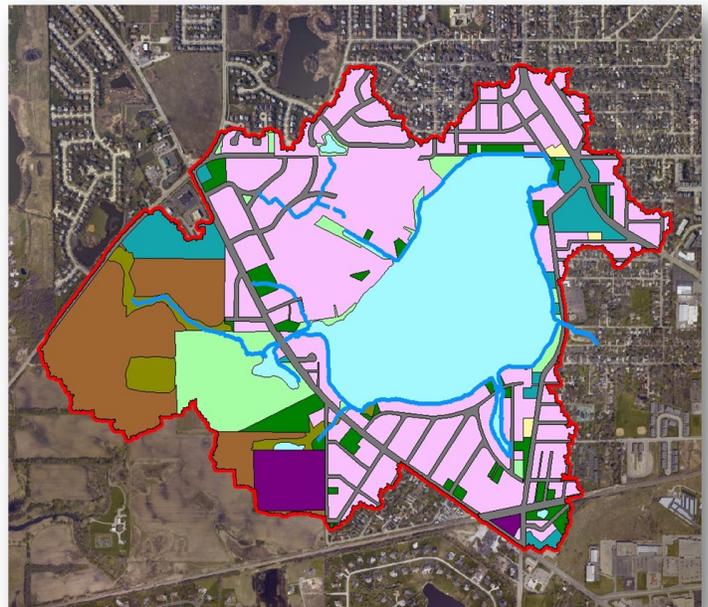
affecting Diamond Lake were from the following land uses: single family homes (34%), and agricultural (11%). Based on the amount of impervious surfaces each land use contributes varied amounts of runoff. Because impervious surfaces (parking lots, roads, buildings, compacted soil) do not allow rain to infiltrate into the ground, more runoff is generated than in the undeveloped condition. The major sources of runoff for Diamond Lake were single family homes (40%), and transportation (34%). The lack of wetland, forest, and grassland areas around the lake increases pollution as runoff and nutrients don't have a chance to be absorbed before entering the lake. Controlling water that runs from the land's surface into the lake is important for drainage lakes.

Direction of watershed:

Diamond Lake receives water from its approximate 686.2 acre watershed that includes four inlets two located on the southwestern portion of the lake by Illinois Route 83, one in the Oak Terrace subdivision and one West Shore Park subdivision. Diamond Lake drains into Indian Creek and eventually the Des Plaines River. The primary land uses within the Diamond Lake watershed were single family homes, water, and agriculture.

2012 LAND USE IN THE DIAMOND LAKE WATERSHED

	Water
	Disturbed Land
	Transportation
	Agricultural
	Government and Institutional
	Wetlands
	Utility and Waste Facilities
	Single Family
	Office
	Retail/Commercial
	Industrial
	Multi Family
	Forest and Grassland
	Public and Private Open Space



WATER CLARITY

Water clarity is an indicator of water quality related to chemical and physical properties.

Measurements taken with a Secchi disk indicate the light penetration into a body of

water. Algae, microscopic animals, water color, eroded soil, and resuspended bottom sediment are factors that interfere with light penetration and reduce water transparency.

The 2012 average water clarity in Diamond Lake was 3.17 feet; this was an 8% decrease in the lake's transparency since 2002 (3.44 feet) However the water clarity was above the county median of 2.99 feet.

VOLUNTEER LAKE MONITORING PROGRAM (VLMP)

The VLMP was established in 1981 to gather information on Illinois inland lakes, and to provide an educational program for citizens. The primary measurement by volunteers is the Secchi depth (water clarity). Other observations such as water color, suspended algae and sediment, aquatic plants and odor are also recorded. The sampling season is May through October with measurements taken twice a month. In 2012, there were **50 lakes** that participated in Lake County.

For more information visit: www.epa.state.il.us/water/vlmp/index.html



A Secchi disk is an eight-inch diameter weighted metal plate painted black and white in alternating quadrants. A calibrated rope is used to lower the disc into the water and measure the depth to which it is visible.



VOLUNTEER LAKE MONITORING

Additional water clarity measurements were taken in Diamond Lake through participation in the Illinois Environmental Protection Agency's (IEPA) Volunteer Lake Monitoring Program (VLMP). Diamond Lake residents Greg and Alice Denny have participated in the program since 2002. Participation in the VLMP program has provided Diamond Lake with annual baseline data that can be used to

determine long-term water quality trends and support current lake management decision making. The average VLMP Secchi disk depth from 2012 was 2.85 feet. Annual VLMP readings have varied from 2.70 feet 2004 to 5.87 feet in 2007. In addition the Denny family has also collected winter data on Diamond Lake, by collecting water clarity and ice thickness during the more challenging months. Diamond

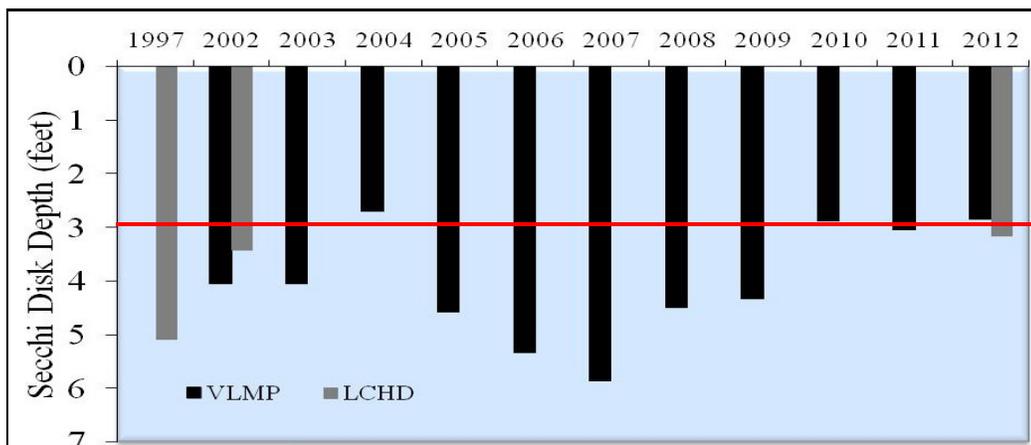
Lake was one of eight lakes to participate including: Loch Lomond, Channel Lake, Catherine Lake, Lake Marie, Fisher Lake, Cedar Lake, and Cross Lake. The volunteers on Diamond Lake have provided data that is vital for the continued monitoring and management of this lake. The LCHD-ES would like to thank them for their efforts and recommend continued involvement in the future.



Greg Denny

11 year VLMP

Winter Data Collection



SECCHI DISK AVERAGES FROM VLMP AND LCHD RECORDS FOR DIAMOND LAKE 1997-2012.

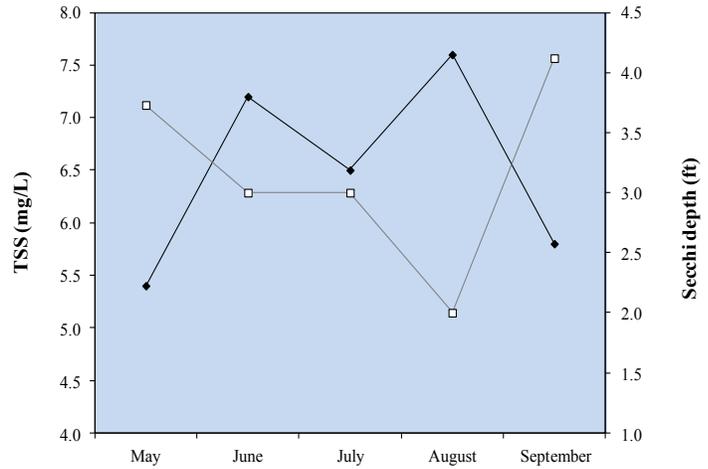
VLMP
 LCHD
 LAKE COUNTY 2011 MEDIAN 2.99 FEET

TOTAL SUSPENDED SOLIDS

Monthly Total Suspended Solid Concentrations and Secchi Depth in Diamond Lake, 2012.

— TSS (mg/L)
 — Secchi Depth (feet)

Another measure of water clarity is turbidity, which is caused by particles of matter rather than dissolved organic compounds. Suspended particles dissipate light, which affects the depth at which plants can grow. The total suspended solid (TSS) parameter (turbidity) is composed of nonvolatile suspended solids (NVSS), non-organic clay or sediment materials, and volatile suspended solids (TVS) (algae and other organic matter).



2012 TSS concentrations averaged 6.5 mg/L which was below the county median of 8.6 mg/L and a 9% increase since the 2002 average concentration of 5.9 mg/L. High TSS values are typically correlated with poor water clarity (Secchi disk depth) and can be detrimental to many aspects of the lake ecosystem including the plant and fish communities.

Calculated nonvolatile suspended solids (NVSS) was 3.4 mg/L. This means that 52% of the TSS concentration

in 2012 can be attributed to organic particles, such as algae and 48% can be attributed to non-organic particles such as sediment. Turbidity caused by algae and sediment reduced the water clarity in Diamond Lake. The highest TSS concentration occurred in August this corresponded with the lowest Secchi depth of the sampling season of 2.0 feet.

Algae blooms were documented July and August in 2011. These were mostly noted as being planktonic, algae that float or drift, in nature.

The quantity and size of power

boats on a lake can contribute to the amount of algae and suspended sediment in a lake by churning up the lake bottom in shallow areas. Motors stir up the lake sediment, re-suspending nutrients (phosphorus) that are at the lake bottom. When these nutrients reach the surface of the water where the algae are, they can feed the algae and increase the density of the algae. This stirring can also decrease the water clarity because of additional particles suspended in the water column.

WHAT YOU CAN DO TO PROTECT DIAMOND LAKE

1. Establish no-wake zones in shallow areas
2. Educate lake users to avoid sensitive areas and drive slowly through shallow areas
3. Keep your boat motor properly trimmed

EFFECTIVE MIXING DEPTH BY ENGINE SIZE

Horsepower	Mixing Depth
10	6
28	10
50	15
100	18

Source: *Lakeline*, December 1991

EFFECTIVE MIXING DEPTH

Effective mixing depth is the maximum depth at which the engine stirs up the water and, in turn, the lake bottom sediment. The importance of these findings is that power boating in shallow areas on lake is likely to stir up bottom sediments, decreasing water clarity and releasing nutrients from the lake bottom, which can feed algae and reduce water clarity.



NUTRIENTS

Organisms take nutrients in from their environment. In a lake, the primary nutrients needed for aquatic plant and algal growth are phosphorus and nitrogen. In most lakes, phosphorus is the limiting nutrient, which means everything that plants and algae need to grow is available in excess: sunlight, warmth, and nitrogen. In Diamond Lake, the limiting nutrient was phosphorus, which has a direct effect on how much aquatic plants and algae can grow in lakes.

The 2012 average total

phosphorus concentration in Diamond Lake was 0.039 mg/L this was a 5% increase from the 2000 concentration (0.037 mg/L) and below the 2012 county median of 0.067 mg/L. Lakes with concentrations exceeding 0.050 mg/L can support high densities of algae and aquatic plants, which can reduce water clarity and dissolved oxygen levels and are considered impaired by the IEPA.

Phosphorus originates from a variety of sources, many of which are related to human activities which include:

human and animal waste, soil erosion, detergents, septic systems, common carp, and runoff from lawns.

Nitrogen is the other nutrient critical for algal growth. Total Kjeldahl nitrogen (TKN) is a measure of organic nitrogen, and is typically bound up in algal and plant cells. The average 2012 TKN for Diamond Lake was 0.84 mg/L, which was below the county median of 1.16 mg/L and a 30% decrease from the 2002 concentration (1.20 mg/L).

WHAT HAS BEEN DONE TO REDUCE PHOSPHORUS LEVELS IN ILLINOIS

July 2010- The state of Illinois passed a law to reduce the amount of phosphorus content in dishwashing and laundry detergents.

July 2010- The state of Illinois passed another law restricting the use of lawn fertilizers containing phosphorus by commercial applicators.

TROPHIC STATE INDEX

Another way to look at phosphorus levels and how they affect lake productivity is to use a Trophic State Index (TSI) based on phosphorus (TSIp). TSIp values are commonly used to classify and compare lake productivity levels (trophic state). A lake's response to additional phosphorus is an accelerated rate of eutrophication. Eutrophication is a natural process where lakes become increasingly enriched with

nutrients. Lakes start out with clear water and few aquatic plants and over time become more enriched with nutrients and vegetation, until the lake becomes a wetland. This process takes thousands of years. However, human activities that supply lakes with additional phosphorus that drives eutrophication is speeding up this process significantly. The TSIp index classifies the lake into one of four categories: oligotrophic

(nutrient-poor, biologically unproductive), mesotrophic (intermediate nutrient availability and biological productivity), eutrophic (nutrient-rich, highly productive), or hypereutrophic (extremely nutrient-rich, productive). In 2012, Diamond Lake was eutrophic with a TSIp value of 57.0. Based on the TSIp, Diamond Lake ranked 45th out of 174 lakes studied by the LCHD-ES from 2000-2012.

WHAT YOU CAN DO TO PROTECT DIAMOND LAKE

1. Do not throw or burn eaves, grass clippings, other organic debris into the street or driveway. Runoff carries these through storm sewers, directly to Diamond Lake
2. Build a rain garden to filter run-off from roofs, driveways, streets. This allows the phosphorus to be bound to the soil so it does not reach surface waters.
3. Sweep up fertilizer that is spilled or inadvertently applied to hard surface areas, do not hose it away.



OLIGOTROPHIC:

Lakes are generally clear, deep and free of weeds or large algae blooms. Though beautiful, they are low in nutrients and do not support large fish populations.



MESOTROPHIC:

Lakes lie between the oligotrophic and eutrophic stages. Devoid of oxygen in late summer, their hypolimnions limit cold water fish and cause phosphorus cycling from sediments.



EUTROPHIC:

Lakes are high in nutrients, they are usually either weedy or subject to frequent algae blooms, or both. Eutrophic lakes often support large fish populations, but are also susceptible to oxygen depletion.

CONDUCTIVITY AND CHLORIDE

THE CRITICAL VALUE FOR CHLORIDES IN AQUATIC SYSTEMS IS 230 MG/L.

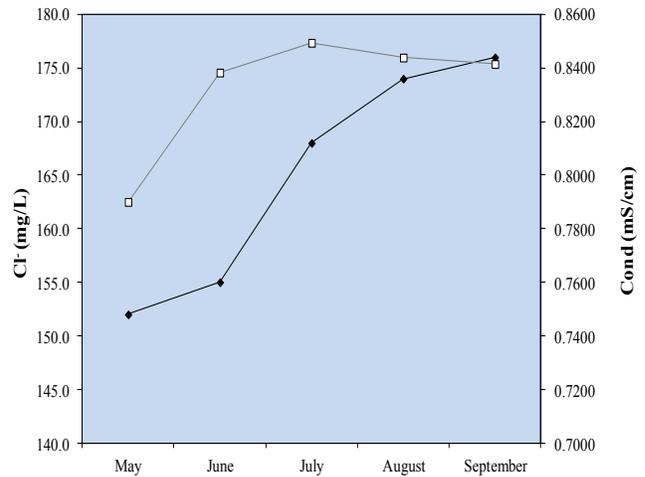


230 mg/L = 1 teaspoon of salt added to 5 gallons of water.

DATE	COND	Cl
May	0.7900	152
June	0.8383	155
July	0.8494	168
August	0.8439	174
September	0.8415	176

Conductivity (mS/cm) and Chloride (mg/L) concentrations in Diamond Lake, 2012.

Another parameter measured during 2012 that is important in comparing data from year to year is conductivity. Conductivity is the measure of different chemical ions in solution. As the concentration of these ions increases, conductivity increases. The conductivity of a lake is dependent on the lake and watershed geology, the size of the watershed flowing into the lake, the land uses within that watershed, and evaporation and bacterial activity. Conductivity has been shown to be highly correlated (in urban areas) with chloride ions found in road salt mixtures. Water bodies most subject to the impacts of road salts are streams, wetlands or lakes draining major roadways. In 2012, Diamond Lake average conductivity was 0.8330 mS/cm. This value was above the county median of 0.7821 mS/cm and a minimal decrease from the 2002 value 0.8374 mS/cm. One of the most common dissolved solids is road salt used in winter road deicing. Most road salt is sodium chloride, calcium

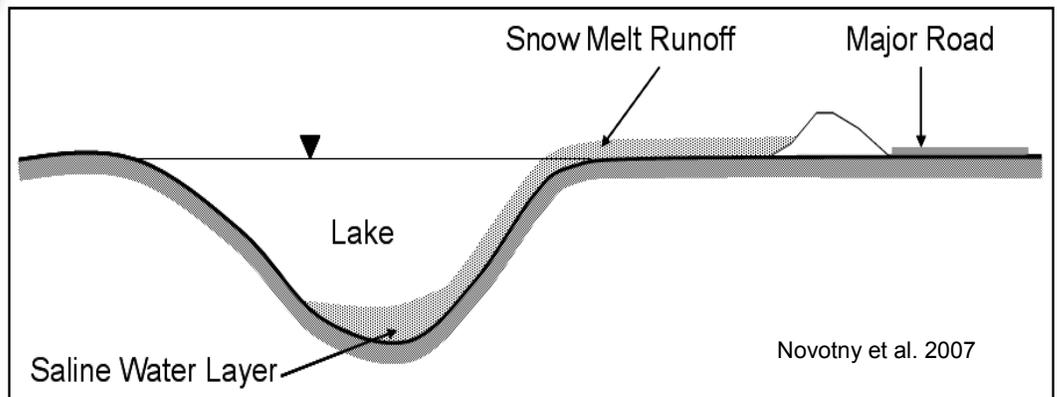


chloride, potassium chloride, magnesium chloride or ferrocyanide salts. The United States Environmental Protection Agency has determined that chloride concentrations higher than 230 mg/L can disrupt aquatic systems. Chlorides tend to accumulate within a watershed as these ions do not break down and are not utilized by plants or animals. High chloride concentrations may make it difficult for many of our native species to survive. However, many of our invasive species, such as Eurasian Watermilfoil, Cattail and Common Reed, are

tolerant to high chloride concentrations. Diamond Lake 2012 average chloride concentration was 165 mg/L, which is above the county median of 153 mg/L. Typically lakes in the county have experienced increases in chloride concentrations in the past 10 years many doubling in concentrations. The insignificant increase in the 2012 chloride concentration is influenced by the mild winter. Diamond Lake chloride levels are influenced by the winter road maintenance of Illinois Highway 83 and United States Highway 45.



As salts dissolve and move through the watershed with snowmelt and storm-water runoff they tend to remain in the water cycle by settling. Diamond Lake has higher concentrations of chlorides in the deeper portions of the lake.



Novotny et al. 2007

CHLORIDES: WHAT HAS BEEN DONE TO REDUCE CHLORIDE LEVELS IN DIAMOND LAKE

The Lake County Division of Transportation (LCDOT) uses an environmentally friendly alternative to salt a liquid by-product consisting of salt brine mix (70%), beet juice (20%) (beet by-product) and calcium chloride (10%). This product will be mixed with the salt on the trucks to create an oatmeal like substance, and then applied to the streets. LCDOT is also enhancing efficiency of snow removal, and going green through innovation and technology. Global

positioning systems (GPS) on snow plows are providing real-time tracking of these vehicles, as well as the application of salt and de-ice materials. The data is then used to better coordinate and target services, saving on salt and gas. In addition the Village of Mundelein Public Works Department has attended Lake County sponsored deicing workshops. These workshops focus on applications rates, calibration, and environmental effects.

This liquid has several advantages:

1. Beet juice adds moisture to help salt work better.
2. Lowers the working temperature of salt to below zero.
3. Creates a composition that sticks to the pavement versus dry salt that can bounce off of the pavement.
4. Reduces salt use by 20%.
5. Environmentally friendly product.

DEICING TIPS TO PROTECT DIAMOND LAKE

1. De-icers melt snow and ice. They provide no traction on top of snow and ice.
2. Anti-icing prevents the bond from forming between pavement and ice.
3. De-icing works best if you plow/shovel before applying material.
4. Pick the right material for the pavement temperatures.
5. Sand only works on top of snow as traction. It provides no melting.
6. Anti-icing chemicals must be applied prior to snow fall.

Pavement Temp. °F	One Pound of Salt (NaCl) melts	Melt Times
30°	46.3 lbs of ice	5 min.
25°	14.4 lbs of ice	10 min.
20°	8.6 lbs of ice	20 min
15°	6.3 lbs of ice	1 hour
10°	4.9 lbs of ice	Dry salt is ineffective and will blow away before it melts anything



In 2012, Mundelein Public Works Department was left with an overabundance of salt and limited storage for next winter.

Anti-icing truck equipped with spar

Source: Daily Herald, 2012

BEACHES



Kerry McCaughey LCHD Lab staff uses black light technology to report E. coli beach data.

2012-2003 Inland Beach Warning and Closed (Swim Ban) List

There are four state licensed swimming beaches on Diamond Lake: Grove Terrace, Lake Terrace, Mundelein Park District, and Oak Terrace. These beaches were sampled for the bacteria Escherichia coli (E. coli) levels every two weeks, from mid May to the end of August, by the LCHD-ES in 2012. The water samples are tested for E. coli bacteria, which are found in the intestines of warm-blooded animals. While not all strains of E. coli are the same, certain strains can make humans sick if ingested in high enough concentrations. If water samples come back high for E. coli (>235 E. coli/100 ml), the

management body for the bathing beach is notified and a sign is posted indicating the swim ban. E. coli is used as an indicator organism, meaning that high concentrations of E. coli might suggest the presence of harmful pathogens such as, Salmonella, Giardia, etc.

From 2003 to 2012 the Mundelein Park District Beach has had the most closures with a total of 28 swim bans while Oak Terrace beach has had the least with ten. In 2004 no swim bans occurred on Diamond Lake; while in 2007 39 swim bans occurred, accounting for 43% total swim bans from 2003 to 2012. The summer of 2007 was hot and with above

average precipitation, inland beaches across the county and Lake Michigan experienced higher concentrations of E. coli.

There are many ways E. coli can end up in a swimming beach. Heavy rainfall and strong wind associated with storms can cause the water to become cloudy with sediment from the lake bottom. Stormwater from rain can also wash in other particles from lawns, streets, and buildings. This sediment and stormwater may contain high concentrations of E. coli. Another source of E. coli contamination is the feces of gulls, geese, and other wildlife.

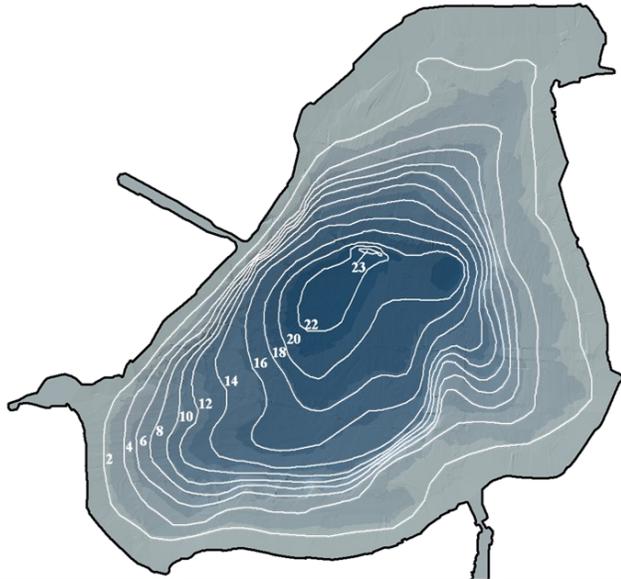
Beach	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	Total Swim Bans
Grove Terrace (West Shore Park #2)	1	2	1	0	0	14	0	0	0	0	18
Lake Terrace	1	1	0	0	0	11	0	0	0	0	13
Mundelein Park Dist.	2	2	1	2	9	6	2	2	0	2	28
Oak Terrace (West Shore Park #1)	1	1	0	0	0	8	0	0	0	0	10
Total	5	6	2	2	9	39	2	2	0	2	69

HOW TO PREVENT ILLNESS AND BEACH CLOSURE



- If you are sick, do NOT swim.
- Don't swim when you have diarrhea. You can spread germs in the water.
- Take a shower prior to entering the beach area.
- Children who are not toilet trained should wear tight fitting rubber or plastic pants.
- Pick up garbage around the beach area.
- Avoid swimming during algae blooms.
- Do not ingest the water while swimming.
- Keep pets, ducks and geese out of the beach area.
- Identify sources of pollution (ex: failing septic systems, stagnant standing water near the beaches, creeks and storm drains).

BATHYMETRIC MAP

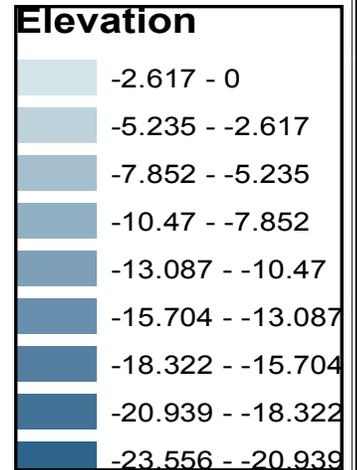


A bathymetric (depth contour) map is an essential tool for effective lake management since it provides critical information about the

physical features of the lake such as depth, surface area, and volume. This information is particularly important when intensive

management techniques such as chemical treatments for plant or algae control, dredging, fish stocking or habitat enhancement are part of the lake's overall management plan.

In November, 2009 the LCHD-ES collected the field data to replace the bathymetric map created by the LCHD-ES in 1997. Field data was collected using Biosonics equipment along with a Trimble GPS unit with sub-foot accuracy. Once collected, the data was analyzed and imported into ArcGIS for further analysis. In ArcGIS, the contours were drawn and the volume was calculated.



This map is intended for water quality reference only, not intended for navigational, swimming, or driving purposes.

STRATIFICATION

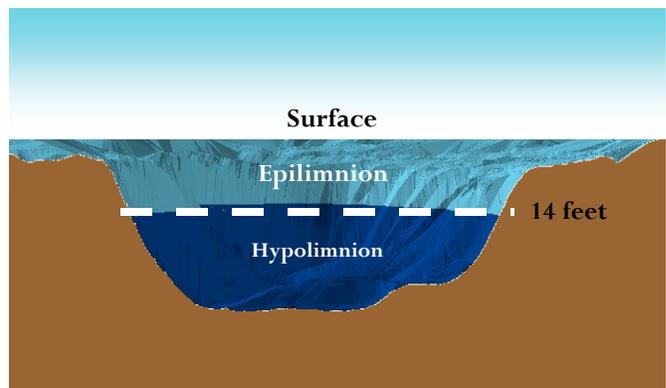
Diamond Lake was thermally stratified from June through August. Thermal stratification is when a lake divides into an upper, warm water layer (epilimnion) and a lower, cold-water layer (hypolimnion). When stratified, the epilimnetic and hypolimnetic waters do not mix, and the hypolimnion typically experiences anoxic conditions (where dissolved oxygen [DO] concentrations drop below 1 mg/L) by mid-summer. In 2012, Diamond Loon Lake was beginning to stratify in May at 16 feet. By July it was strongly stratified at approximately 14 feet. The

thermocline (the transitional region between the epilimnion and the hypolimnion) remained strong in August and a complete turnover (mixing) had occurred by the September.

A DO concentration of greater than 5.0 mg/L is recommended to maintain a healthy fishery in a lake. DO concentrations in the epilimnion did not drop below 6.3 mg/L. However, anoxic conditions existed from June through August in the hypolimnion. This is a normal phenomenon in large, deep lakes that stratify. The

anoxic boundary ranged from 16 feet (June) to 18 feet (July and August). This represents 3.6% to 2.4%, respectively, of the lake volume based on the bathymetric map created by the LCHD-ES in 2009.

An illustration illustrating the epilimnion and hypolimnion, July, 2012



The tips of the braches are crowded with leaves giving it a "Coontail" resemblance.



COONTAIL

CERATOPHYLLUM DEMERSUM

OVERWINTERS AS A EVERGREEN PLANT, IT PROVIDES IMPORTANT HABITAT TO MANY INVERTEBRATES AND PROVIDES FISH WITH YEAR ROUND HABITAT.

DISTRIBUTION OF RAKE DENSITY ACROSS ALL SAMPLES SITES IN 2012 (SEE MAP TO RIGHT)

Rake Density	# of	%
No plants	109	64.9
>0 to 10%	21	12.5
>10 to 40%	15	8.9
>40 to 60%	8	4.8
>60 to 90%	4	2.4
>90%	11	6.5
Total Sites with Plants	59	35.1
Total # of Sites	168	100.0

AQUATIC PLANTS

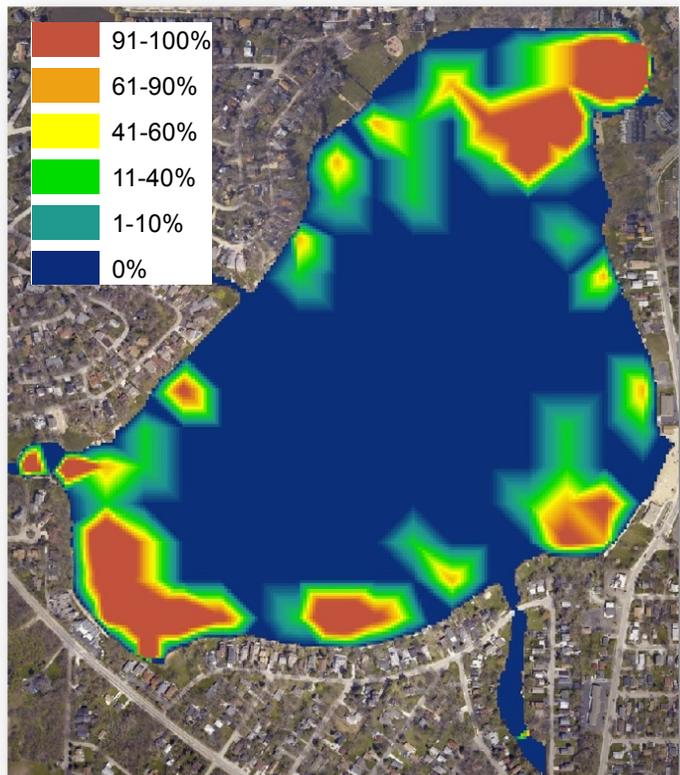
Plants growing in our lakes, ponds, and streams are called macrophytes. These aquatic plants appear in many shapes and sizes. Some have leaves that float on the water surface, while others grow completely underwater. In moderation, aquatic plants are aesthetically pleasing and desirable environmentally. Their presence is natural and normal in lakes.

Aquatic plant sampling was conducted on Diamond Lake in April and July 2012. There were 168 points generated based on a computer grid system with points 60 meters apart. Aquatic plants occurred at 45 of the sites in April and 59 sites in July (27 % and 35% total lake coverage, respectively). The 2012 aquatic plant community included one macro-algae and 7 aquatic plant species; two are exotic and invasive: Eurasian Watermilfoil and Curlyleaf Pondweed. Species diversity decreased from 2002 with the loss of Slender Naiad, Water Stargrass, and Vallisneria. In 2012 the most common species was Coontail and Eurasian Watermilfoil at 20% and 17% of the sampled sites, respectively,

while Sago Pondweed was common at 11% of the sampled sites. Coontail is a submersed aquatic plant with coarse, bushy stems and no roots. Lacking true roots, the plants may drift between a variety of depths during the growing season. Coontail overwinters as an evergreen plant, providing habitat to invertebrates and fish year round.

The diversity and extent of plant populations can be influenced by a variety of factors. Water clarity and depth are the major limiting factors in determining the maximum depth at which aquatic plants will grow. When the light level in the water

column falls below 1% of the surface light level, plants can no longer grow. The 1% light level in Diamond Lake ranged from 12-14 feet during the sampling season. Plants were found at a maximum depth of 7.0 feet. A healthy aquatic plant population is critical to good lake health. Aquatic vegetation provides important wildlife habitat and food sources. Aquatic vegetation provides important wildlife habitat and food sources. Additionally, aquatic plants provide many water quality benefits such as sediment stabilization and competition with algae for available resources.



FLORISTIC QUALITY INDEX

Floristic quality index (FQI) is an assessment tool designed to evaluate the closeness the flora of an area is to that of undisturbed conditions. It can be used to: 1) identify natural areas, 2) compare the quality of different sites or different locations within a single site, 3) monitor long-term floristic trends, and 4) monitor habitat restoration efforts. Each

aquatic plant in a lake is assigned a number between 1 and 10 (10 indicating the plant species most sensitive to disturbance). This is done for every floating and submersed plant species found in the lake. An FQI is calculated by multiplying the average of these numbers by the square root of the number of these plant species found in the

lake. A high FQI number indicates that a large number of sensitive, high quality plant species present in the lake. Non-native species were also included in the FQI calculations for Lake County lakes. The median FQI for Lake County lakes from 2000 -2012 was 12.7. Diamond Lake had an FQI of 3.7 ranking 145th out of 160.

AQUATIC PLANTS: WHERE DO THEY GROW?

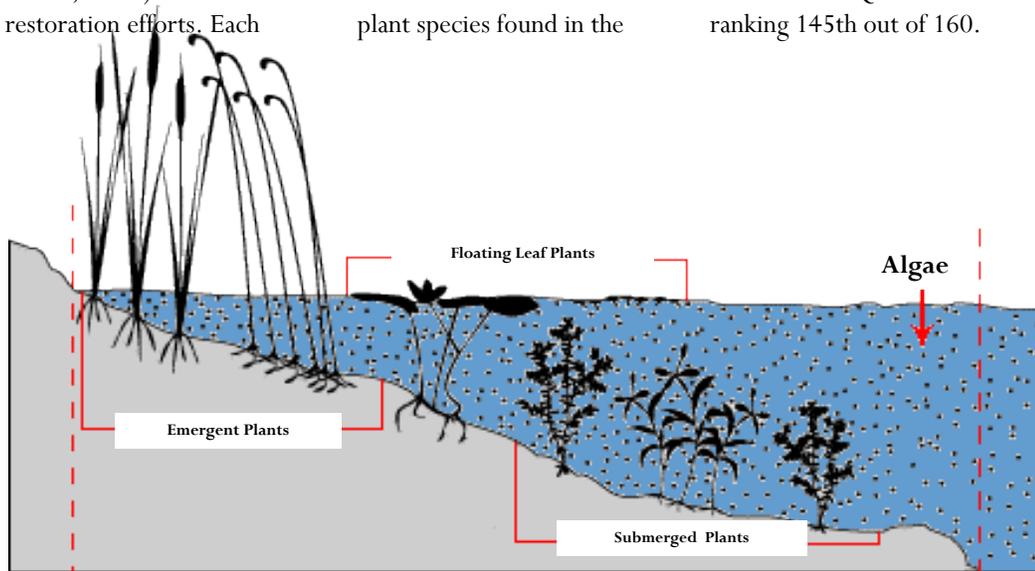
Littoral Zone— the area that aquatic plants grow in a lake.

Algae— have no true roots, stems, or leaves and range in size from tiny, one-celled organisms to large, multicelled plant-like organisms.

Submerged Plants— have stems and leaves that grow entirely underwater, although some may also have floating leaves.

Floating-leaf Plants— are often rooted in the lake bottom, but their leaves and flowers flat on the water surface.

Emergent Plants— are rooted in the lake bottom, but their leaves and stems extend out of the water.



Source: Minnesota Department of Natural Resources

← Littoral Zone →

IN MANY LAKES MACROPHYTES CONTRIBUTE TO THE AESTHETICALLY PLEASING APPEARANCE OF THE SETTING AND ARE ENJOYABLE IN THEIR OWN RIGHT. BUT EVEN MORE IMPORTANT, THEY ARE AN ESSENTIAL ELEMENT IN THE LIFE SYSTEMS OF MOST LAKES.

- Macrophyte leaves and stems provide a habitat or home for small attached plants and animals. Some are microscopic in size and some are larger. These attached organisms are valuable as food for animals higher in the food chain, such as fish and birds.
- Many types of small organisms live in the sediment. There are insects that spend the immature stages of life in the sediments, leaving when they become adults. Decomposing plant life provides part of the food supply for these sediment-dwelling organisms and the emerging insects, in turn, are food for fish.
- The submerged portions of macrophytes provide shelter and cover for small or young fish from larger fish that would feed on them.
- Types of plants that extend above the water can provide cover for waterfowl and their young, and many plants can serve directly as food for certain types of waterfowl.
- Aquatic plants provide many water quality benefits such as sediment stabilization and competition with algae for available nutrients.

ILLUSTRATION OF EURASIAN WATERMILFOIL

Illustration provided by:
IFAS, Center for Aquatic Plants
University of Florida, Gainesville, 1990



DISTRIBUTION OF EWM



EURASIAN WATERMILFOIL

Eurasian Watermilfoil (EWM) is a feathery submerged aquatic plant that can quickly form thick mats in shallow areas of lakes and rivers in North America. These mats can interfere with swimming and entangle propellers, which hinders boating fishing, and waterfowl hunting. Matted milfoil can displace native aquatic plants, impacting fish and wildlife. Since it was discovered in North America in the 1940's, EWM has invaded nearly every US state and at least three Canadian Provinces. Milfoil spreads when plant pieces break off and float on water currents. It can cross land to new waters by clinging to sailboats, personal watercraft, powerboats, motors, trailers,

and fishing gear.

The Mundelein Park District hires an aquatic herbicide applicator to annually treat parcels they own in the northern portion of the lake and the area near the Mundelein Park District beach for aquatic plants. In 2012 chemical applications on these parcels specifically targeted EWM by using a selective herbicide (2-4D) and applied in areas that were the most dense. The 2012 abundance of EWM in Diamond Lake had decreased by 12% since 2011. EWM was present at 9% of sample site in April and 17% of the sample sites in July. Populations were most dense in the southern portion of the lake and at depths between

two and four feet outside of treatment areas.

An aquatic plant management plan is critical to maintaining the health of the lake and a balanced aquatic plant community. The plan should be based on the management goals of the lake and involve usage issues, habitat maintenance/restoration, and limitations of the lake. The primary focus of the plan must include the control of exotic aquatic species including EWM and Curlyleaf Pondweed. Follow up is critical to achieve long-term success. A good aquatic plant management plan considers both the short and long-term needs of the lake.



DISTRIBUTION OF EURASIAN WATERMILFOIL DENSITY ACROSS ALL SAMPLES SITES IN APRIL (LEFT) AND JULY (RIGHT) 2012



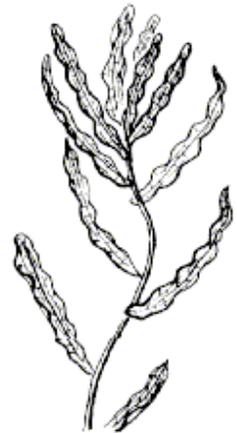
CURLYLEAF PONDWEED

Curlyleaf Pondweed (CLP) is an invasive aquatic perennial that is native to Eurasia, Africa, and Australia. It was accidentally introduced to United States waters in the mid-1880s by hobbyists who used it as an aquarium plant. The leaves are reddish-green, oblong, and about 3 inches long, with distinct wavy edges that are finely toothed. The stem of the plant is flat, reddish-brown and grows from 1 to 3 feet long. This aquatic plant has an unusual life history. Unlike our native

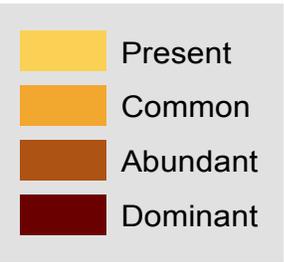
pondweeds it begins growing in the early spring. CLP has even been documented growing under the ice in lakes! The plant then reaches maturity in mid summer typically June in Lake County when our natives are starting to emerge. CLP becomes invasive in some areas because of its adaptations for low light tolerance and low water temperatures which allow the plant to get a head start and outcompete native plants in the spring. In mid-summer, when most aquatic plants are growing,

CLP plants are dying off. Plant die-offs may result in a critical loss of dissolved oxygen. Large populations of CLP also can cause changes in nutrient availability. In midsummer, CLP plants usually die back which is typically followed by an increase in phosphorus availability that may fuel nuisance algal blooms. CLP can form dense mats that may interfere with boating and other recreational uses. In July 2012 in Diamond Lake CLP was present, plants being found at 6 sampled sites (4% of lake). Curlyleaf Pondweed was not documented in the 2002 lake study, and at this time the density of CLP is not causing fluctuations in nutrient availability. The Diamond Lake aquatic plant management plan should prioritize the reduction in CLP populations while densities are low. This could be accomplished by manually removing the plants using an aquatic plant rake. This method also eliminates or reduces the need for chemicals treatments that would require alternative applications than those currently targeting EWM.

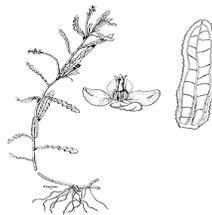
ILLUSTRATION OF CURLYLEAF PONDWEED



CURLYLEAF PONDWEED DENSITY AT 6 SITES ON DIAMOND LAKE IN JULY 2012,



POTAMOGETON CRISPUS **EXOTIC***



KEY FEATURES:

STEM: ARE FLATTENED, BRANCHED, CAN FORM DENSE STANDS IN WATER UP TO 15 FEET DEEP.

LEAF: ALTERNATE ALL SUBMERSED, OBLONG, STIFF, TRANSLUCENT LEAVES HAVE DISTINCTLY WAVY EDGES WITH FINE TEETH AND 3 MAIN VEINS.

FLOWER: TINY, WITH 4 PETAL-LIKE LOBES. IN SPIKES 1-3CM LONG ON STALKS UP TO 7CM LONG. (MAY SEE TURIONS WHICH OVER WINTERS AS A HARD, BROWN, BUR-LIKE BUD WITH CROWDED, SMALL HOLLY-LIKE LEAVES).

COMMON NAMES:
CURLYLEAF PONDWEED

ORIGIN: EXOTIC*
ASIA, AFRICA, AND EUROPE FOUND THROUGHOUT LAKE COUNTY AND ILLINOIS

IMPORTANCE:
INVASIVE: HAS A TOLERANCE FOR LOW LIGHT AND WATER TEMPERATURES THAT ALLOW THE PLANT TO GET A HEAD START ON NATIVE PLANTS. BY MID SUMMER WHEN MOST AQUATIC PLANTS ARE GROWING, CURLYLEAF PLANTS ARE DYING OFF. WHICH MAY RESULT IN A CRITICAL LOSS OF DISSOLVED OXYGEN AND AN INCREASE IN NUTRIENTS.

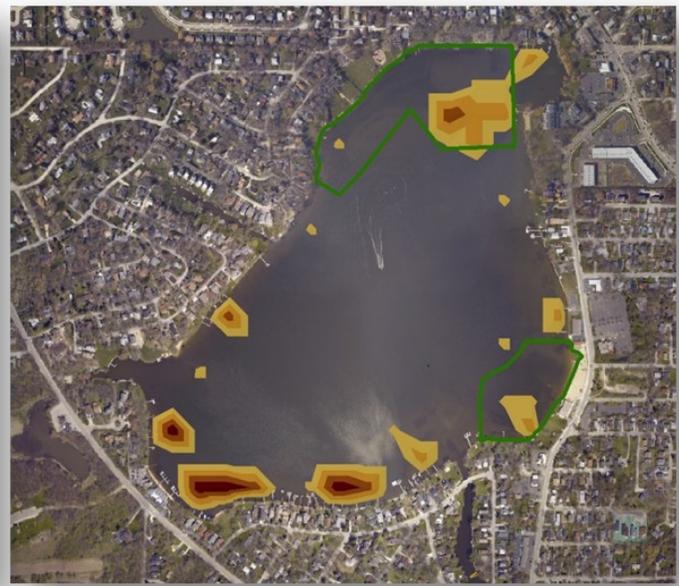
LOOK ALIKES:
NONE

AQUATIC HERBICIDES-ENDOTHALL AND 2, 4-D

The Park District and some residents have expressed concerns about the aquatic plant populations in Diamond Lake that hinder recreational activities. The Mundelein Park District hires an aquatic herbicide applicator to annually treat parcels they own in the northern portion of the lake and the area near the Mundelein Park District beach for aquatic plants. Past applications have included applications of Reward. Reward is a non-selective contact herbicide, meaning it kills any plants that come in contact with it. Since 2002

the chemical applications and concentrations have not resulted in a documented reduction in the Eurasian Watermilfoil population. In May 2012 a total of 26 acres were treated with 2,4D to reduce exotic Eurasian Watermilfoil populations. 2, 4D is a relatively fast-acting, systemic, selective herbicide used for the control of Eurasian Watermilfoil and other broad-leaved species. Both the granular and liquid formulations can be effective for spot treatment of Eurasian Watermilfoil. 2,4-D has been shown to be selective to

Eurasian Watermilfoil when used at the labeled rate, leaving native aquatic species relatively unaffected. Coontail is a native plant in Diamond Lake that is also susceptible to 2,4-D. For a healthy aquatic plant community native plant populations need to expand, so special care in the timing of the applications should be considered. This product should be applied while the exotics are actively growing and before our native plants emerge.



DISTRIBUTION OF EURASIAN WATERMILFOIL DENSITY ACROSS ALL SAMPLES SITES IN JULY 2011 (LEFT) USING A NON-SELECTIVE HERBICIDE AND JULY (RIGHT) 2012 USING A EWM SELECTIVE HERBICIDE



NEW PERMIT REQUIREMENTS FOR APPLYING PESTICIDES IN WATERS

A National Pesticide Elimination System (NPDES) permit is required when pesticides are applied to, over or near the waters of the State. This permit applies to all public waters that have an outflow to the State waters. A Notice of Intent (NOI) must be filled and submitted electronically to the Illinois Environmental Protection Agency (IEPA) at least 14 days prior to any application of pesticides.

- **When is a NPDES permit needed?**

Prior to any pesticide application made directly to, over or near waters of the state.

- **Who should obtain NPDES permit coverage?**

The individual pond owner who will apply the herbicide. If the pond owner hires a contract applicator either the contract applicator or the pond owner could apply for NPDES coverage.

- **How do I apply for NPDES permit coverage?**

File a Notice of Intent (NOI) with the IEPA. The form can be printed from the site listed above. Don't forget the 14 day public notice period and the information regarding the approval and notification process listed above, so plan ahead

- **What does the permit cost?**

Currently there is no fee however fees may be introduced at a later date.

- **How long is the permit good for?**

Five years from the date of issuance but not from the date of coverage.

- **Is anything else needed besides the permit?**

An Adverse Incident Report is needed if there are any adverse impacts related to the application such as spills or accidental overdosing. The incident must be reported to the Illinois Emergency Management Agency immediately and the report must follow within 15 days.

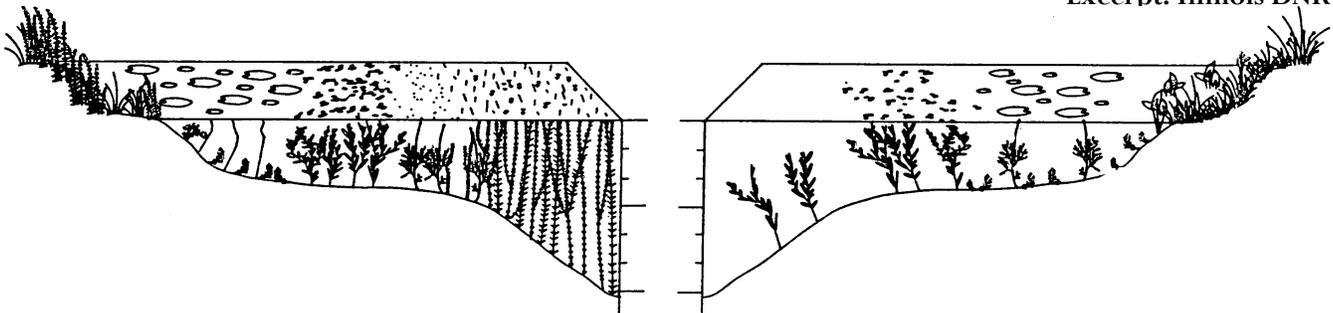
A Pesticide Discharge Management Plan (PDMP) is required if the annual threshold of 80 acres is past and if you do not meet any of the additional exemptions within the permit. The threshold is determined not only by the size of the pond or lake but by the number of treatments. For example, if a 10 acre pond is treated 9 times with different herbicides within a one-year period, it would be counted as 90 treatment acres and the 80 acre threshold limit would have been passed. This would trigger the need for a PDMP. If treated with the same herbicide 9 times, the additional treatments would not count toward the threshold.

- **Additional things to remember**

You are allowed to apply only a pesticide that is labeled for aquatic use. The General NPDES permit only applies to pesticide applications that will be made directly to or over waters of the State or at water's edge. Pesticide applications to dry ditches which discharge into waters of the State may also require General NPDES permit coverage.

Excerpt: Illinois DNR

**FOR FULL DETAILS OF
THE RULE**
[HTTP://
WWW.EPA.STATE.IL.US/
WATER/PERMITS/
PESTICIDE/INDEX.HTML](http://www.epa.state.il.us/water/permits/pesticide/index.html)



A KEY TO A HEALTHY LAKE IS A WELL-BALANCED AQUATIC PLANT POPULATION

ILLUSTRATION OF ZEBRA MUSSEL



ZEBRA MUSSELS WERE DOCUMENTED IN DIAMOND LAKE IN 2008. CURRENTLY 26 LAKE ARE INFESTED IN LAKE COUNTY

ZEBRA MUSSELS

In 2008, zebra mussels (*Dreissena polymorpha*) were discovered in Diamond Lake. These mussels are believed to have been spread to this country in the mid 1980's by cargo ships from Europe that discharged their ballast water into the Great Lakes. The mussels spread throughout the Great Lakes and by 1991 had made their way into the Illinois and Mississippi Rivers. In 1999, the first sighting of the mussel in Lake County (besides Lake Michigan and the Chain of Lakes) occurred. Currently, 26 inland lakes in the county are known to be infested with the zebra mussel, but this number could be much higher, since the mussel has probably gone unnoticed in many lakes. Due to their quick life cycle and explosive growth rate,

zebra mussels can quickly edge out native mussel species. Negative impacts on native bivalve populations include interferences with feeding, habitat, growth, movement and reproduction. The impact that the mussels have on fish populations is not fully understood. However, zebra mussels feed on algae, which is also a major food source for planktivorous fish, such as bluegills, which are food for bass and pike. Zebra mussels have also caused economic problems for large power plants, public water supplies, and industrial facilities, where they clog water intake pipes. Studies on the transport of the zebra mussel have shown that they can be found in any area of a boat that holds water, including the engine cooling



STOP AQUATIC HITCHHIKERS!™

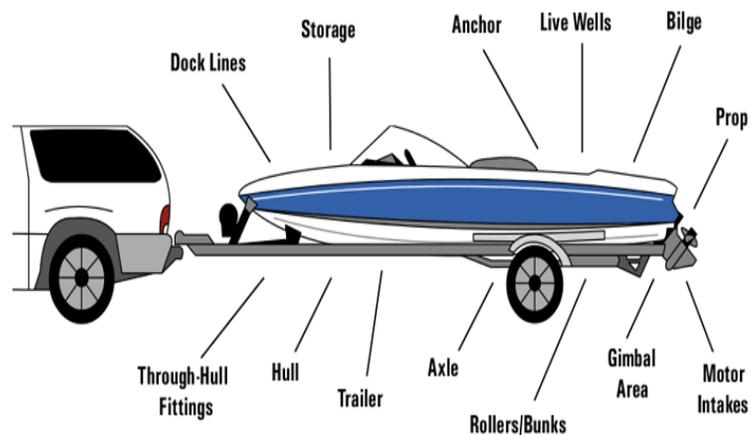
system, bilge water, and bait buckets used in fishing. The researchers also found that many of the mussel larvae were being transported via aquatic plants that were taken from one lake to another on boats or boat trailers. The larvae did not appear to be transported by attaching to the sides of the boats themselves.

Although it is too late to prevent the infestation of Diamond Lake, below several steps are listed to help prevent the introduction of the mussel into other lakes via transport by boat.

WHAT YOU CAN DO TO REDUCE THE SPREAD OF EXOTIC SPECIES

- Educate themselves on what the species looks like and how it can be spread
- Remain diligent about removing plants and emptying all sources of water from boats being transferred from Diamond Lake to other lakes; Remove all mud and dirt since it might contain aquatic hitchhikers.
- Continue to post signs at the all boat launches educating boaters about the presence of zebra mussels (and Eurasian Watermilfoil, Curlyleaf Pondweed), the negative impacts it can have on a lake and ways to prevent the spread.
- Never release plants, fish or animals into a body of water unless they came out of that body of water.

Before launching and before leaving...
Inspect everything!



2008 FISH SURVEY: ILLINOIS DIVISION OF NATURAL RESOURCES

September of 2009 the Illinois Department of Natural Resources (IDNR) conducted a 60 minute daytime electrofishing survey of Diamond Lake. The survey was undertaken to assess the abundance and diversity of the current fish population and to collect fish flesh contaminant samples for the IEPA. The IDNR collected 623 fish representing 13 species. Bluegill dominated the fishery at 54% of the catch followed by Golden Shiners (21%) and Common Carp (9%).

The IDNR used an index called the Proportional Stock Density (PSD) to evaluate adult abundance of Largemouth Bass in the sample. The index compares the number of fish longer than 12" (Quality size) to the number of bass longer than 8" (Stock size) and produces a value that can be used to compare samples from different years or different lakes. A balanced population

has a PSD value between 40% and 60%. This indicates that the population consists of larger fish which should support natural reproduction. The PSD value however was skewed because only 3 fish between 8" and 12" in length were collected compared to 9 fish over 12". The IDNR recommends aquatic vegetation cover of at least 20% of the lake surface to help increase the survival of small fish. In 2012 the LCHD-ES documented 35% aquatic plant coverage.

Bluegill made up 54% of the sample even though they were only collected for a quarter of the sample time. Due to the large quantities of Bluegill, IDNR focuses their collection on size groups and sunfish diversity to save space and reduce stress in the holding tank. Overall in 2009 the quality of this fishery has slipped slightly to below management objectives of a PSD between 40 and 60. In 2003 the PSD was 37, in

2006 the PSD was 23 and in 2009 the PSD of the sample was 22. These data suggest the population is made up of a larger proportion of smaller size fish. In 2008 no bluegill over 7" were collected.

Yellow bass were significantly less abundant during this survey (<1% of the catch) compared to the 24% of the catch in past surveys. Yellow bass can significantly impact the ecology of the lake by foraging on eggs and fry of more desirable fish. Yellow bass were first documented in Diamond Lake in 1989 when 2 fish were collected. They then expanded to represent approximately 25% of the catch from surveys in 1997 through 2006. The expansion was undoubtedly responsible for declines in bluegill, crappie, yellow perch and largemouth bass populations through inter-specific competition and nest predation.

FISHING LOGS

YOU CAN TRACK/DETECT CHANGES IN THE FISHERY BY RECORDING CATCHES AND OBSERVATIONS IN FISHING LOGS!

Illinois Division of Natural Resources Electro-fishing Survey

Pictures provided by: Lake Lindenhurst Lake Commission



COLLECTION



DATA



EQUIPMENT

2008 FISH SURVEY: ILLINOIS DIVISION OF NATURAL RESOURCES CONTINUED



Common carp are one of the most damaging aquatic invasive species due to their feeding behavior that disrupts shallowly rooted plants muddying the water. This action increases turbidity and releases phosphorus that increases algae abundance.

New to the 2008 Diamond Lake fish population was Gizzard Shad, Seeing gizzard shad indicates a fish movement between a creek or drainage and the lake. There are gizzard shad in the Des Plaines River drainage so it's highly possible these fish came from that system and upstream of the spillway.

Channel Catfish made up 5% of the catch, IDNR reduced the stocking rate from 50 fish per acre to 25 fish per acre in 1993 in an effort to improve stock structure and condition however, follow-up surveys

indicated no improvement so in 2001 the stocking rate was again reduced (10 fish per acre). Stock structure has improved slightly with PSD's increasing to 15 (in 2008) and 22 (in 2006) from 8 in 2003. Condition, as measured by Relative Weight (Wr), improved with the reduction in stocking rate. Relative Weight (Wr) values increased from 93 in the early 1990's to an average Wr of 102 in 2006 and 99 in 2008. Fish are considered healthy and plump when Wr's range between 90 and 105. Further stocking

reductions don't appear to be warranted at this time. Annual allotments of channel catfish are driven by the Hatchery stocking model and have remained relatively constant at approximately 1500 non-vulnerable size fish the past 4 or 5 years. Future stocking for Diamond Lake will include Muskellunge. Following the 2008 IDNR fish survey fisheries biologist, Frank Jakubicek, had the following recommendations for Diamond Lake.

IDNR 2008 RECOMMENDATIONS

1. Stock walleye at a rate of 25 to 35 fingerlings per acre every other year to develop and maintain their presence.
2. Conduct a standardized fish population survey in 2011.
3. The State should continue to stock 300, 8 inch, northern pike fingerlings annually.
4. The State should continue to stock 1500 non-vulnerable catfish annually.
5. Maintain vegetation in the lake equivalent to at least 20% of surface area.
6. Check signs to verify current regulations are posted and located at each public access area.
7. Encourage fishermen to target and remove carp they catch.

SPECIES	NUMBER	PERCENT	MINIMUM	AVERAGE	MAXIMUM
LARGEMOUTH BASS	25	4.01	2.5	9.5	20.7
BLUEGILL	336	53.93	2.4	4.9	6.8
PUMPKINSEED	1	0.16	4.2	4.2	4.2
BLACK CRAPPIE	1	0.16	9.7	9.7	9.7
YELLOW BASS	4	0.64	5.7	6.7	7.5
WALLEYE	2	0.32	8.8	9.5	10.2
YELLOW PERCH	26	4.17	3.3	5.9	7.4
NORTHERN PIKE	1	0.16	21.4	21.4	21.4
CHANNEL CATFISH	28	4.49	7.0	14.4	25.0
CARP	56	8.99	16.2	21.0	25.4
GOLDEN SHINER	131	21.03	1.2	4.6	8.1
EMERALD SHINER	1	0.16	2.9	2.9	2.9
GIZZARD SHAD	11	1.77	3	3.6	4.9

SPECIES= 13

623

100.00

LENGTH (inches)

DIAMOND LAKE WATER QUALITY IMPROVEMENTS



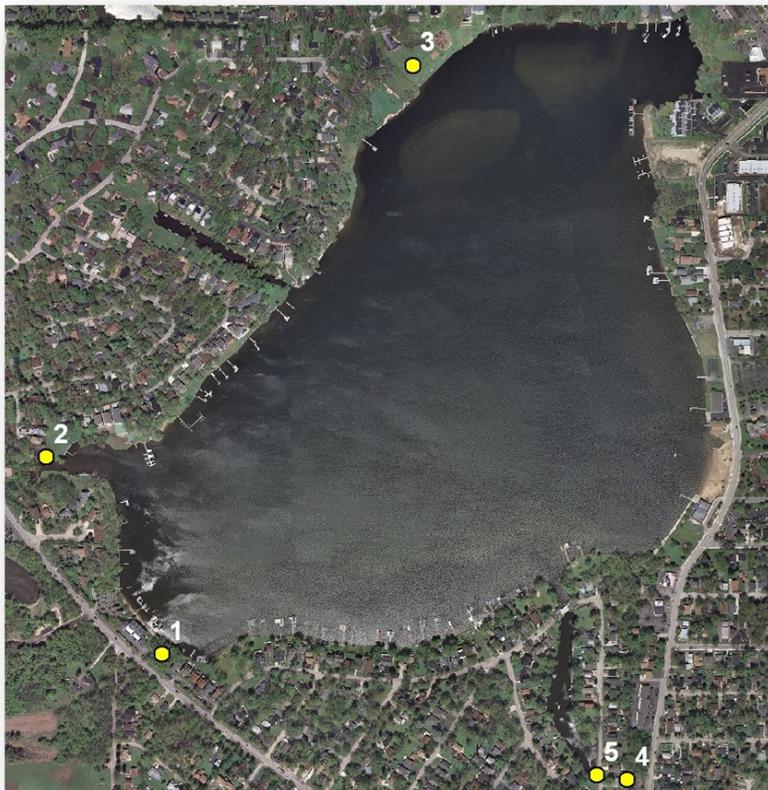
FOR MORE INFORMATION VISIT:
[HTTP://WWW.INDIANCREEKWP.ORG/](http://WWW.INDIANCREEKWP.ORG/)

The Indian Creek Watershed Project, Ltd. (ICWP) is a local non-profit organization that was formed in 2000 to promote watershed education, stakeholder outreach, and to help improve water quality conditions in the Indian Creek Watershed. Diamond Lake was identified as a key area of concern because of its location, natural lake properties, and stormwater

runoff impacts from land uses around the lake. In 2002 the LCHD-ES Diamond Lake summary report noted the following lake problems in Diamond Lake: water clarity, limited habitat, shoreline erosion, localized excessive aquatic plants, and invasive shoreline plants. Using Illinois Section 319 Funding from the IEPA the ICWP developed the Diamond Lake Area Cooperative Water

Quality Improvement Strategy. The focal point of the project was implementing a series of five best management projects that were used to inform stakeholders living around the lake about ways to help intervene and to attempt to improve common land use behavior for the preservation and protection of Diamond Lake.

DIAMOND LAKE IMPROVEMENT SITES



Specific improvements were made to these Diamond Lake sites as indicated on the map.

- 1 **Wiech Park streamside restoration** (owned by Mundelein Park and Recreation District)
- 2 **West Shore Park dual rain garden implementation** (owned by West Shore Park Corporation a homeowners association)
- 3 Not completed due to long term site maintenance concerns
- 4 **Hanson Park streamside restoration** (floodplain site is owned by Oak Terrace Homeowners)
- 5 **Oak Terrace roadside buffer rain garden implementation** (site is owned by Fremont Township)

ENVIRONMENTAL SERVICES

Senior Biologist: Mike Adam

madam@lakecountyiil.gov

Population Health Services
500 W. Winchester Road
Libertyville, Illinois 60048-1331

Phone: 847-377-8030

Fax: 847-984-5622

**For more information visit
us at:**

[http://
www.lakecountyiil.gov/
Health/want/
BeachLakeInfo.htm](http://www.lakecountyiil.gov/Health/want/BeachLakeInfo.htm)

Protecting the quality of our lakes is an increasing concern of Lake County residents. Each lake is a valuable resource that must be properly managed if it is to be enjoyed by future generations. To assist with this endeavor, Population Health Environmental Services provides technical expertise essential to the management and protection of Lake County surface waters.

Environmental Service's goal is to monitor the quality of the county's surface water in order to:

- Maintain or improve water quality and alleviate nuisance conditions
- Promote healthy and safe lake conditions
- Protect and improve ecological diversity

Services provided are either of a technical or educational nature and are provided by a professional staff of scientists to government agencies (county, township and municipal), lake property owners' associations and private individuals on all bodies of water within Lake County.

LAKE RECOMMENDATIONS

Diamond Lake's 2012 water quality was comparable to 2002. Minimal increases in total phosphorus, total suspended solids and water clarity however these parameters could be influenced by the drought conditions and/or sampling time. The aquatic plant community experienced a decrease in Eurasian Watermilfoil however the presence of the exotic invasive Curlyleaf Pondweed is a concern.

Diamond Lake, lake's management is administered by multiple entities. To improve the overall quality of Diamond Lake, the ES (Environmental Services) has the following recommendations:

- **Create a Diamond Lake Improvement organization that represents the multiple lake users and management entities on the lake**
- **Decrease Eurasian Watermilfoil population**
- **Target Curlyleaf Pondweed while populations are low**
- **Continue Participation in Volunteer Lake Monitoring Program**
- **Participate in the Clean Waters Clean Boats Program**
- **Encourage homeowners to incorporate native plants in their landscaping through rain gardens or shoreline filter strips**
- **Continue fish work with Illinois Division of Natural Resources**
- **Install a permanent staff gage**
- **Consider wake restrictions in near shore or shallow areas**
- **Use salt alternatives and proper application procedures.**



West Shore Park Rain Garden Planting, 2009